The shape of science

How Economics Shapes Science

Paula Stephan

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Reviewed by Barry Bozeman

Several years ago, I was approached by a young, highly productive biology researcher who was interested in working as a visiting scholar in my research program on science and technology policy. I inquired as to why she, still untenured, would risk setting aside a year from her heretofore-successful career in a highly competitive field. Her response: "I spend almost all my time looking through a microscope. But when I look up from the microscope and try to understand all the forces that affect my work—the politics, the funding, the federal bureaucracy—I realize I have very little understanding of them."

Paula Stephan's book, *How Economics Shapes Science*, provides an excellent, low-cost and cogent alternative to a postdoc or visiting position for those who want to know more about the political and economic aspects of science. In fact, her well-written and accessible book accomplishes this task better than any other book I have encountered. Stephan notes in her preface that she wrote the book "for policy makers, as well as for members of the general public who share an interest in the workings of public institutions and the study of science." In my judgment, practicing scientists will benefit enormously from reading it.

Stephan says her book is about US science and about the economics of science. Both claims are much too modest. One of the most appealing parts of the book is that, although she focuses chiefly on US science, she makes interesting and useful comparisons with many other nations. As a practicing science policy scholar, I learned a great deal from these comparisons. The book is not limited to the US, nor is it limited to the economics of science: it is about the economics, politics, policy and sociology of science, with a few bits of history thrown into the mix.

The book begins by asking, "What does economics have to do with science?" Most of this first chapter will be familiar territory to those accustomed to thinking about the social context of science. The chapter shows the ways in which science depends on costs, resources and incentives; science is not simply puzzle-solving occurring in a political and economic vacuum. However, the very next chapter gives puzzle-solving its due, observing that most people enter into science out of curiosity, even if their motives do not stop there. The chapter draws from Stephan's deep knowledge of the sociology of science, discussing the role of social recognition and reputation and the importance of contests, competition and discovery priority.

Stephan returns to core economics question in the third chapter, aptly and succinctly entitled "Money." Here, as in most of the book, the focus is on university science. She discusses the impacts of patenting and licensing, university entrepreneurialism and even the relation of faculty pay to productivity. In a later chapter, "Funding for Research," Stephan goes well beyond the typical straightforward reporting. She provides an in-depth analysis of a variety of means of allocating funds, ranging from US National Institutes of Health and National Science Foundation peer-review systems to newer approaches such as prize competitions. She also shows how funding approaches tend to be very different in the US, where competition is key, compared to most European and some Asian nations, where stable, fixed allocations are more often the norm.

Stephan is a research leader in the analysis of scientific careers, and two chapters ("The Market for Scientists and Engineers" and "The Foreign Born") reflect this expertise. She does an especially commendable job of dealing with the tricky issue of alleged shortages in scientific and technical human capital. Stephan poses policy questions and provides some prescriptions in all of the book's chapters, but the concluding one ("Can We Do Better?") offers a number of specific prescriptions on such issues as improving grants allocations and the efficiency of 'big science' and a number of ideas about improving scientific career opportunities and mobility.

Despite its value, the book has a few limitations. The book is really about university science and virtually ignores the research occurring in industry and government laboratories. Another weakness of the book is in some respects a strength: Stephan strives for accessibility and succeeds, but she trades off theory for interpretation and synthesis. In my view, she errs on the correct side. There are plenty of books about, say, the public-goods characteristics of science, but I know of no other book occupying the important niche as synthesizer and translator of the economics (and sociology and politics) of science for a highly educated, motivated and professional audience. Nor do the abstruse theory books present us with a smorgasbord of wonderful anecdotes. Who knew that the cost differential between keeping a female versus a male research mouse? Or that Turkish scholars receive 7.5% of their faculty salaries from bonuses paid for each article published? True, these and hundreds of other factoids are not the most beneficial aspect of the book, but they certainly contribute to the reader's enjoyment.

COMPETING FINANCIAL INTERESTS
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